

**Puget Sound TRT**  
**Tuesday September 17<sup>th</sup>**  
**NWFSC Seattle, WA – Room 370 W**

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**TRT Attendees:** Mary Ruckelshaus, Bill Graeber, Norma Jean Sands, Jim Scott, Kit Rawson, Ken Currens *Absentee: Bob Fuerstenberg*

**Visitors:** David Bergendorf, Denise Krownbell, Scott Brewer, Jenny Moslemi, Jon Hoekstra, J.J. Westfall, Ray Hilborn, Mark Scheuerell, Jim Myers, Elizabeth Babcock

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**VRAP (Viability and Risk Assessment Procedure) Model update presented by Norma Sands:** Model estimates extinction risk or acceptable harvest levels for populations given abundance thresholds. Inputs include selection of a R:S function (e.g., hockey stick, Beverton-Holt, Ricker) and environmental variables (e.g., flow, ocean survival.)

**Modeling Salmon Habitat, Productivity, Capacity, Harvest, and Hatcheries (Ray Hilborn and Mark Scheuerell):** SHIRAZ is a quantitative framework for evaluating the effects of habitat, harvest and hatcheries on salmon production and capacity. This is a modeling framework with no given parameters--functional relationships are provided by the biologist. Recent activity - Muckleshoot tribe came looking for a way to build an ESA restoration plan; an alternative to EDT that was transparent and changeable and allowed for stochastic factors, particularly hydrology. SHIRAZ is similar to EDT except it: has as its core a population dynamic model, so habitat and population characteristics can be time-dynamic; allows for stochastic variables; and is good for looking at interactions among the H's. The TRT thought that it would be interesting to try and link EDT habitat info to SHIRAZ. Ray Hilborn will send an electronic copy of a paper in review that illustrates how habitat and hatchery influences on salmon can be integrated using SHIRAZ.

**All-H Model: *Assessing the relative impacts of habitat quality, hydro-dams, harvest, and hatchery production on Pacific salmon*, presented by Jon Hoekstra:** Jon presented a statistical modeling approach that seeks to estimate the relative direct and indirect impacts of each H on salmon population metrics, and the interactions among the H's. The approach is to compile spatially referenced data, analyze covariance structure of data, and estimate the effect of H's on a response variable (in this example, lambda). It is important to note that the model is meant to provide generalizations, not specifications and that the model *leads* to hypotheses. It is also important to note that we must have a uniform layer of data to add the data to the model, thus the larger the scope, the less specific detailed data can be included. The model works to provide one with correlations and patterns but not processes.

*Application of the All-H model to the Puget Sound:*

- Risk of sample size limitation (better scaled to salmon biology)
- Incorporated of higher resolution data into sub-models of Hs
- Examination of alternative response variables
- Exploration of alternative path models

The TRT is interested in whether this would be useful as more than a heuristic tool if it is applied to the Puget Sound.

**Population Viability draft:** Suggested next steps: (1) draft up figures we will include in the paper for TRT discussion next time; include results from PVA and HPVA as curves; (2) clarify language in Intro about “recovery goals” vs. “viability” and how harvestable surplus may (or may not) be a result. The TRT agreed that the planning range does not guarantee that harvest goals will be met, only that they are consistent with population viability; (3) Include sensitivity of the results to the assumptions and parameter definitions in the model (e.g., sigma squared—already done; QET, p(ext), others?); (4) Include more references and background for the habitat based models (Jim Scott will help); (5) Kit will have Paul McElhany review the PVA section; and (6) Helpful for next time: reviewing the PVA section, and suggested wording for discussion about the differences in approaches.

**ESU Viability draft.** Suggested next steps: (1) we need more work to describe why the three indicators (ecology, geo-hydrology, geomorphology) are useful in defining geographic regions for salmon; (2) Need to document all references in the draft; (3) Ken will check the list of historical populations; (4) continue analyses for defining diversity groups (see below); (5) more work on defining and using population risk levels in ESU viability scenarios (see below).

#### **Major diversity groups analysis (Jenny Moslemi):**

Data used:

- Mean spawner age
- Proportion of sub-yearlings out migrating
- Mean spawn timing
- Hydro regions

Mary notes that some of the groups the TRT has been using do not match with Jenny’s results. This is the case for Elwha and Dungeness, Skykomish and Snoqualmie, late Stillaguamish and Late Skagit, and Dosewallips and Skokomish (the odd-balls). Suggested next steps: Include genetic data, updated sub-yearling out migration data, and statistical summaries of the membership in and definitions of the sets in the next analysis.

**Multiple levels of population risk for ESU viability scenarios:** Two main issues: (1) how to define categories of risk and (2) how to use categories of risk at ESU level in viability scenarios. After discussion, the TRT acknowledged that risk categories could be defined but that the technical basis for defining such groups is arbitrary. It is also not at all clear how we could combine or trade-off different risk categories in determining whether the ESU is viable. The TRT feels that this issue needs more discussion with the SS work group and the Development Committee—so that they can understand that we cannot be confident in our decision regarding categories of risk.

**Draft Watershed Guidance Paper** The new outline is well received. Questions were revised somewhat, the TRT agreed to discuss the questions further on a call 9/25 so that the SS work group can have a copy of the questions (and an example tool table or 2) by the first week of October. Author leads: Jim Scott will be lead in the habitat section, Norma Sands (with help from Susan Bishop and Jim Myers and others) will lead the harvest section, and Ken will be the lead for the hatchery section.

Overall question for hatchery day on 9/30: What approaches exist for evaluating the effects of hatchery practices on VSP parameters in chinook populations? How does your tool address this issue?

**Big issues days coming up / Future meetings to schedule:** ESU risk categories for populations (date not set), VRAP and strategy meeting regarding Phase II analyses in case study watersheds (9/27); discussion of watershed guidance draft (10/8).

**Updates on Ozette:** Norma notes that we have been trying to put together one A & P table and probably have enough data to do that now. Generally, there is not a good time series of abundance data for the Ozette Lake sockeye. The TRT agreed that we should track down long-term data sets of sockeye populations that are relatively free of hatchery or harvest impacts (or those can be factored out) for use in estimating variability of populations; Ken gave updates on genetic data analyses

**Update of HC summer chum progress:** no new news to report.